Center for Independent Experts (CIE) Reviewer's Independent Peer Review Report on the 2015 Stock Assessment Review (STAR) Panel 3 on the Assessment of Black Rockfish.

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Prepared for

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Executive Summary

The 2015 Stock Assessment Review (STAR) Panel 3 on assessments of Black rockfish (*Sebastes melanops*) met in Newport, Oregon, from Monday, July 20 to Friday, July 24 2015. The meeting was chaired by Dr Andrew Cooper from the Scientific and Statistical Committee and Simon Fraser University. The review panel (the Panel) was composed of Dr Paul Spencer, NMFS Alaska Fisheries Science Center, and two scientists affiliated with the Center for Independent Experts: Mr Patrick Cordue and Dr Neil Klaer. The meeting generally followed the draft agenda and included presentations by the stock assessment teams (STATs) mixed with questions and open discussion. Timing changes were due to the problems encountered by the STAT for Oregon in arriving at a base case. Additional analyses were requested by the Panel from the STATs and the results of those were also subsequently presented. The Panel participated in the review of each Term of Reference (ToR) for the meeting. After model presentations and general discussions, the first four days of the meeting were devoted to the examination of various aspects of the models through the request and response process and the final day was mostly devoted to preparation of the draft STAR Panel report.

For the Washington and California models, there were a number of examinations that led to changes to the base cases. Some configuration issues for the Oregon model were resolved during the meeting, but an acceptable base case was not arrived at in time for considered review, so was recommended for mop-up. My own particular interests for the requests was justification for the use of selectivity as a mechanism for reduced numbers of older females in fisheries catches, as opposed to increased natural mortality (as used in the previous assessment and for other rockfish).

Findings for the Oregon model

On the first day, the meeting was informed that the Oregon model was producing a good proportion of runs that crashed (producing QNAN and -1.#IND errors) on the last phase of estimation. During the course of the meeting, two configuration issues were identified that were causing problems: (1) control file settings for abundance index sds inadvertently added a value of 1 to the sd for each index and (2) initial and prior bounds for the tagging index q were entered into the control file as linear rather than log values. Some meeting and STAT time was also devoted to the removal of input data associated with landings in Astoria that were actually caught in Washington. An initial model for Oregon may have become available on Friday morning, leaving insufficient time to properly review that model (including full diagnostics) within the timeframe of the meeting. It was recommended that the Oregon model go to mop-up, to allow sufficient preparation of a base case for review.

Findings for the Washington and California models

Comprehensive sensitivity analyses were conducted prior to the STAR Panel Review that evaluated the removal of data and (independently) the various assumptions regarding the estimated additional process error variance on abundance indices, growth, maturity ogives, fecundity, selectivity, and natural mortality.

As no diagnostics were available to examine unavailable spawning output (spawning output refers to the biomass of larvae produced by female spawners), the Panel determined some specifications for how to make those calculations from the SS output. Both the Washington and California draft models showed high proportions of spawning output unavailable to fisheries throughout the series, and also a considerable reservoir of spawning output in the plus group. The diagnostics were illuminating and led to the STAT to change their mind on this hypothesis for a base case and revert to the one used for previous assessments accounting for the disappearance of older females with a sex-specific M (and exclusion of dome-shaped selectivity except for the live-fish fishery).

An M ramp was not necessary to provide a good fit to available data, and the simpler model that estimates constant male and female M by age separately was sufficient to explain the absence of older females. Additional explorations and requests led to five changes to the draft Washington and California assessments that were agreed by the STAT to be included in the accepted base cases: (1) use of an improved functional maturity relationship explored during the meeting, (2) exclusion of dome-shaped selection except for the live-fish fishery, (3) estimation of sex-specific M within the model, (4) only estimating recruitment deviations that were informed by data as indicated by the recruitment deviation variance, and (5) using a fixed value of sigma r of 0.5 with no re-tuning.

The Panel agreed that the modified base cases for Washington and California were the best currently available for the provision of management advice.

1 Introduction

1.1 Background

The 2015 Stock Assessment Review (STAR) Panel 3 on assessments of Black rockfish (*Sebastes melanops*) met in Newport, Oregon, from Monday, July 20 to Friday, July 24 2015. The meeting was chaired by Dr Andrew Cooper from the Scientific and Statistical Committee and Simon Fraser University. The review panel (the Panel) was composed Dr Paul Spencer, NMFS Alaska Fisheries Science Center, and two scientists affiliated with the Center for Independent Experts: Mr Patrick Cordue and Dr Neil Klaer.

Draft stock assessment reports as well as all associated background documents were made available via a public FTP site to the Panel on 9 July prior to the review meeting. During the meeting, all documents were available electronically via the same FTP site, and additional documents and presentations made during the meeting were also posted there.

The meeting generally followed the draft agenda and included presentations by the stock assessment teams (STATs) mixed with questions and open discussion. Timing changes were due to the problems encountered by the STAT for Oregon in arriving at a base case. Additional analyses were requested by the Panel from the STATs and the results of those were also subsequently presented. A summary of those requests, rationale and STAT responses is contained in the Stock Assessment Review Panel Meeting Reports for each species. The Panel participated in the review of each Term of Reference (ToR) for the meeting.

1.2 Review Activities

After model presentations and general discussions, the first four days of the meeting were devoted to the examination of various aspects of the models through the request and response process.

For the Washington and California models there were a number of examinations that led to changes to the base cases. Some configuration issues for the Oregon model were resolved during the meeting, but an acceptable base case was not arrived at in time for considered review, so was recommended for mop-up. My own particular interests for the requests was justification for the use of selectivity as a mechanism for reduced numbers of older females in fisheries catches, as opposed to increased natural mortality (as used in the previous assessment and for other rockfish). A draft STAR Panel Meeting Report was completed on the last day, and edited during the weeks following the meeting via email.

Tasks were distributed among the reviewers for working towards a draft report during the meeting, so I provided a draft for data issues. Similarities in some of my comments below and the draft meeting report are due to that process.

2 Review of the Black rockfish assessments

2.1 Terms of reference

The Panel considered the assessments in light of the terms of reference provided as follows:

1. Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.

2. Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.

3. Evaluate model assumptions, estimates, and major sources of uncertainty.

4. Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.

5. Determine whether the science reviewed is considered to be the best scientific information available.

6. When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.

7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

2.2 Findings by term of reference

The comments below refer to aspects that were examined during the meeting, but include my own additional commentary for preparation of this CIE report.

2.2.1 Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.

The PFMC (2014) Status of the Pacific Coast Groundfish Fishery: Stock Assessment and Fishery Evaluation report provides a very useful summary of the distribution and life history, and stock status and management history for the rockfish species. The previous assessment and associated STAR panel report provide a useful starting point for the evaluation of progress by the STAT in addressing previous concerns, and for noting those that remain. The PFMC Terms of Reference for the Groundfish and Coastal Pelagic Species Stock Assessment Review Process for 2015-16 (September 2014) includes an outline for stock assessment documents that is commendable. A section is included that addresses responses to previous STAR panel recommendations was included in the draft Black rockfish assessment.

A nearshore stock assessment workshop was carried out in 2015 for Black rockfish, China rockfish and Kelp greenling, so input data for Black rockfish was subjected to earlier examination this year. The workshop also examined options for inclusion in the assessment of data from the Washington Black rockfish tagging program, and additional considerations for the standardization of abundance indices. There were a large number of recommendations for the 2015 assessment of Black rockfish from this workshop. Those recommendations are equal or perhaps more important than those from previous STAR Panels, so it would have been useful to include a section in the draft assessment report on responses to those recommendations.

2.2.2 Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.

Stock boundary

Stock boundaries might ideally be based on the following standards in priority order: (1) research information that provides direct evidence for chosen boundaries (e.g. genetic or movement studies), (2) biogeographic regions that appear to define strong boundaries for many stocks based on oceanographic conditions and/or apparent presence or absence of a variety of species, (3) indirect evidence of stock separation due to breaks in occurrence (possibly due to lack of suitable habitat, or apparent biological differences in growth and/or age composition), (4) lines drawn at prominent ocean features that may define biogeographic regions and (5) lines drawn for data aggregation or management convenience at fishery management region, state or national boundaries. Additional work to further develop an objective procedure for evaluating the chosen stock boundaries across all rockfish (and potentially all other) assessments may be beneficial, and also more directly point to required

directions for future research or assessment collaboration across national/international political boundaries.

According to background documents, Black rockfish occur at depths most commonly less than 54m (from the surface to greater than 366m), from Southern California (San Miguel Island) to the Aleutian Islands (Amchitka Island) and they occur most commonly from San Francisco northward. They are medium-lived to more than 20 years of age, schooling, associated with rocky structure and bear live larvae. Black rockfish off the northern Washington coast and outer Strait of Juan de Fuca exhibit no significant movement. However, fish appear to move from the central Washington coast southward to the Columbia River, but not into waters off Oregon. Movement displayed by black rockfish off the northern Oregon coast is primarily northward to the Columbia River. Tagging studies have documented some individuals moving several hundred miles, but the vast majority of them were recaptured close to the area of initial capture.

Without definitive research to provide justification for stock boundaries, biogeographic information suggests that Cape Mendocino at 40°10' N latitude and Columbia River plume at 46°16' N would provide justifiable boundaries within the western US area. The Columbia River at the WA/OR border was used for the Washington stock region, satisfying level (4) above. For simplification of statistical aggregation, the CA/OR border 42°00' N was used instead of Cape Mendocino, only satisfying level (5) above. There is a possibility of interaction of the Washington stock (adults, juveniles and larvae) particularly with British Columbia, so the Washington stock boundary at the US border is also level (5). Each of these suggests that selection of stock boundaries remains a considerable uncertainty for the assessment of Black rockfish, and that further research to establish more justifiable boundaries is warranted, and that assessment sensitivity to these choices should be examined. There appears to only be incomplete catch history reconstruction and no formal stock assessment for Black rockfish in Canadian waters at this stage.

Catches

Black rockfish are caught by a wide variety of gear types and in recent decades have been a very important target species for recreational charter-boats and private sport anglers in Washington and Oregon, and to a lesser extent in California. Commercial trawl landings in the past were substantial, particularly in Washington.

Catch for most rockfish species is uncertain, particularly for historical period where unspecified rockfish catch needs to be separated by species using assumptions about species ratios. Further work can be done to evaluate catch uncertainty and to provide alternative plausible catch series for sensitivity testing using the assessment model. Formal historical rockfish catch reconstructions have recently been undertaken in Oregon and California, but not for Washington. Additional work is required in each state to better justify most likely catch histories and also to define alternatives that encapsulate major uncertainties for sensitivity testing (Res).

Fishing fleets

Table 1.Fishing fleet summary

Region	ID	Name	Method	Catch rank	Selectivity
Washington	1	Commercial trawl	Trawl	2	Asymp M 11 Dome F 9-15
	2	Commercial non-trawl	Mostly hook and line	4	Asymp M 7 Dome F 7-18
	3	Recreational	Hook and line	1	Asymp M 7 Dome F 7-16
Oregon	1	Commercial trawl	Trawl	4	Asymp M 12 Dome F 8-13
	2	Commercial live non-trawl		4	Dome 5-12
	3	Commercial dead non-trawl		3	Asymp M 6 Dome F 6-13
	4	Recreational		1	Asymp M 5 Dome F 5-12
	5	Recreational		1	Asymp M 5 Dome F 5-12
California	1	Commercial trawl	Trawl	4	Asymp M 10 Dome F 8-15
	2	Commercial dead non-trawl		3	Asymp M 5 Dome F 5-13
	3	Commercial live non-trawl		5	Asymp M 4 Dome F 4-16
	4	Recreational		1	Asymp M 3 Dome F 3-12

Notes: Catch rank indicates the importance of overall removals within each state and may be equal and miss values to emphasize minor ranks; Selectivity indicates the implied age-based selection of the draft assessment model, asymptotic or domed, separated by sex where necessary (M and F) and indicating the approximate age at 50% full selection.

The draft base models presented for review assumed dome selectivity on females to explain the lack of older females in the catch. Further discussion and investigation of alternatives was undertaken during the review (see 2.2.3 below).

Abundance indices

Given the large number of available abundance indices, it was noted during the meeting that the Panel was unable to examine each in detail. The Panel was able to endorse standard procedures used and endorsed by the SSC for many of the indices: delta GLM for individual fishing operations, and Stephens-MacCall filtering of aggregated data by trip or stop followed by a delta GLM. An improved process would be for a data group to examine and approve input data and methods for standardization prior to stock assessments. A data meeting was carried out for nearshore rockfish in March/April 2015, but did not provide endorsement for standardization procedures to be used for each abundance index (see recommendations for the future below).

I provided a template for a summary table of abundance indices for completion by the STAT as a request (Table 2). Such a summary provides a useful overview and should be included in assessment documents. Highlights from the table are: (1) that no fishery-independent abundance indices are available, (2) that procedures used to derive tag abundance and commercial logbook CPUE are yet to be endorsed, and (3) that the dockside CPUE for WA and onboard observer CPFV 00-14 indices have been ranked highest by the STAT. Currently, there is not an existing requirement to rank available abundance indices within the STAR process, and I recommend that this be considered as standard for the future. Rankings should indicate how much freedom a stock assessment should be allowed in adding additional process error to an index - i.e. it should not be based on already known properties such as length of the series, measurement CVs etc., but give an indication of how well an index should be actually indicating abundance and whether it may be biased.

Table 2.Abundance index summary

Region	ID	Fleet	Years	Name	Fishery independent	Filtering	Method	Rank	Endoresed
WA	1	4	1981-2014	Dockside CPUE	No	trip, area, month, Stephens-MacCall	delta-GLM (bin-gamma)	1	SSC
WA	2	5	1986-2013	Tagging CPUE	No	Spring trips, PCA 2	delta-GLM (bin-gamma)	2	SSC
WA	3	5	2000-2013	Tag abundance	No	None	Petersen	3	No
OR	1	5	2001, 2003-2014	Onboard observer CPFV	No	Positive drifts	delta-GLM (bin-lognormal)		SSC
OR	2	6	2002-2013	Tag abundance	No	None	Mark-recovery		No
OR	3	7	1980-2000	MRFSS recreational	No	Stephens-MacCall trip	Delta-GLM (bin-gamma)		SSC
OR	4	8	2001-2014	ORBS survey	No	Stephens-MacCall	Delta-GLM (bin-gamma)		SSC
OR	5	9	2004-2013	Commercial logbook CPUE	No	Custom criteria	Delta-GLM (bin-gamma)		No
CA	1	4	1988-1999	Onboard observer CPFV 88-99	No	Custom filter, Positive drifts	delta-GLM (bin-lognormal)	2	SSC
CA	2	5	2000-2014	Onboard observer CPFV 00-14	No	Custom filter, Positive drifts	delta-GLM (bin-lognormal)	1	SSC
CA	4	6	1980-2003	Dockside- MRFSS CPUE	No	Stephens-MacCall	delta-GLM (bin-gamma)	3	SSC

Use of objective procedures for the selection of lognormal or gamma error distributions for the submodel for delta-GLMs (other than examination of diagnostics by eye) was a topic of discussion by past STAR Panels for other species. This should be considered further.

Length and age composition data

Length compositions are primarily from the recreational fishery, although some were from the commercial fisheries in Oregon and California. Trawl length composition data from landings in Astoria in Oregon were found to have mostly been taken in Washington, so were removed from the Oregon model during the meeting.

Most recreational length data arises from the MRFSS program that does not record sex. Length and age data from the Oregon ORBS program are the only source that records sex. MRFSS recreational length composition data are expanded according to year, boat type, bi-monthly period and state. Length or age data from ORBS and commercial fisheries samples for individual strata were combined by expanding by the estimated numbers of fish in that strata to produce weighted average estimates of length or age composition.

There is little evidence in any of the length composition data of modes that may indicate strong cohorts moving through the population from year to year.

Age data have recently become available for the California assessment from the Abrams (2014), Lea et al. (1999), the NWFSC and the SWFSC, providing in the order of 2,000 commercial and recreational age samples from 1979 to 2013, mostly by sex. Oregon has in the order of 500 age samples per year from 1974 (n=242), and 1992-2013 mostly from the commercial live fish and recreational fisheries. Washington has the most available age data of the three areas, with about 8,000 samples from commercial fisheries primarily from 1980 to 1995, and in the order of 1,000 samples per year from 1984 to 2014. Nearly all age samples are by sex. For all three areas, age data were modeled as condition age-at-length.

2.2.3 Evaluate model assumptions, estimates, and major sources of uncertainty.

The STATs were assigned to different regions – one for Washington and California, and one for Oregon.

Each of the independent regional assessments was carried out using Stock Synthesis (SS ver. 3.24v), attempting to include all data sources including new ones particularly for new abundance indices and additional age-at-length data not available for previous assessments.

Model uncertainty was addressed by conducting sensitivity analyses, likelihood profiles, and retrospective analyses. A major uncertainty across the three models is a lack of female fish for ages older than ~10 years (as indicated by age-specific sex ratios from catch data. For the Washington and California models, comprehensive sensitivity analyses were conducted prior to the STAR Panel Review that evaluated the removal of data and (independently) the various assumptions regarding the estimated additional process error variance on abundance indices, growth, maturity ogives, fecundity, selectivity, and natural mortality. A total of 30 and 29 sensitivity runs were conducted for the Washington and California models, respectively. The California and Washington models were sensitive to the treatment of maturity, selectivity and natural mortality, as ramping of M for females at older ages decreased the stock scale. Recruitment deviations were relatively insensitive to alternative configurations of selectivity and natural mortality.

2.2.3.1 Oregon model

We had heard prior to the review that the STAT was having difficulty producing a stable model for Oregon. On the first day, the meeting was informed about the Oregon model producing a good proportion of runs that crashed (producing QNAN and -1.#IND errors) on

the last phase of estimation. Runs that did complete, however, seemed to be producing the same overall likelihood values, so were possibly acceptable. Individual data sets and groups of parameters had been removed individually from the model, but a source of the error had not been found. I suggested that running SS using an interactive debugger might help resolve where the error was coming from, but this was not feasible in the short timeframe available to the STAR Panel. I personally was reluctant to go ahead with a model showing this kind of instability, but the Panel (including myself) agreed to go ahead with the review of the base case regardless.

On presenting model diagnostics, the STAT pointed out that the additional sd being estimated for abundance indices were zero, even though the model output plots showed much larger error bounds than the input sds suggested for all indices. On investigation of the report file during the meeting it was discovered that a value of one had been added to the sd for all of the indices somehow. I asked Jason Cope if he knew of a place in the control file that might cause such a problem and the source of the error was found as a row of ones in the settings that should have been zero.

During the meeting it was also discovered that the Oregon model contained a good proportion of trawl length compositions from landings in Astoria that were most likely from fish caught in Washington. Sorting this data issue out (removing them from the input data for Oregon) took considerable time.

The meeting heard that the Black rockfish tagging study in Oregon produces an estimate of absolute biomass in numbers. Use of habitat data mapped by area suggested that the region tagged may have about 10% of the total biomass of Black rockfish along the Oregon coast, so this was an excellent piece of information that could be used to tie down the biomass for the Oregon model. The base-case was at that stage producing an implausibly low biomass that was all but fished out at the end of the series. The tagging study biomass was already included in the base, with what we were told was a broad prior on q. The panel suggested that further runs of the Oregon model should set a narrow prior for the tagging study q at near 0.1 (suggested range 0.07 to 0.13).

On presenting the modified Oregon model on Thursday the STAT pointed out that the latest model still showed an implausible depletion and also that the estimated value of q for the tagging study appeared to be hitting a bound, and was not allowed to values lower than 1. Patrick Cordue drew the meeting's attention to the fact that q is specified in SS in log space, making me think that this might again be a specification problem (log 1 being 0 as the clue). On investigation of the control file during the meeting it was discovered that the STAT had been assuming that INIT, LO and HI values for the prior were specified in natural rather than log space, so the low bound on q was actually just a small amount above 1 (this was probably also the cause of the model instability). It was also decided by the meeting late on Thursday that an initial model for Oregon may be available on Friday morning, leaving insufficient time to properly review that model (including full diagnostics) within the timeframe of the meeting. It was recommended that the Oregon model go to mop-up, to allow sufficient preparation of a base case for review.

2.2.3.2 Washington and California models

In previous assessments only length-based logistic selection had been used and the absence of old females in catches was explained by ramping up the female natural mortality rate (Sampson 2007, Wallace et al. 2008). There are at least two hypotheses that might be used to explain the absence of older females – either by reducing them through natural mortality or making them unavailable to fisheries through dome-shaped selectivity. Draft base models were prepared using the latter hypothesis. I was concerned that such models can lead to the creation of large amounts of hidden spawning biomass that is even hidden to analysts because there currently are no diagnostics to display it. There has been line fishing fairly widely along the coast in all habitats, and also no direct evidence of a large number of old females that occur somewhere not normally available to fishing.

As no diagnostics were available to examine unavailable spawning output I asked if this could be looked at as a time-series during the meeting. The Panel determined some specifications for what to calculate from the SS output, and Andy Cooper and Meghan Stachura spent an evening working out R code to produce diagnostic plots from the R4SS object (Figures 1 and 2).

Both the Washington and California draft models showed high proportions of spawning output unavailable to fisheries throughout the series, and also a considerable reservoir of spawning output in the plus group. The diagnostics were illuminating and led to the STAT to change their mind on this hypothesis for a base case and revert to the one used for previous assessments accounting for the disappearance of older females with a sex-specific M (and exclusion of dome-shaped selectivity except for the live-fish fishery). Any stock assessment that includes dome-shaped selectivity on substantial fisheries should examine diagnostics such as this, so an improved version of the code has been suggested for inclusion in R4SS.

It was found during the meeting that an M ramp was not necessary to provide a good fit to available data, and the simpler model that estimates constant male and female M by age separately was sufficient to explain the absence of older females. This was a surprise to me given the implementation of M ramps for other rockfish species in previous STAR Panels this year. As M ramps are rather arbitrary in their functional form and starting year, a more parsimonious assessment is produced if this simpler assumption still provides a good fit to available data. All stock assessments that include an M ramp should justify whether the ramp is required versus the simpler assumption of constant M for all ages.

Figure 1.Unavailable spawning output for Washington

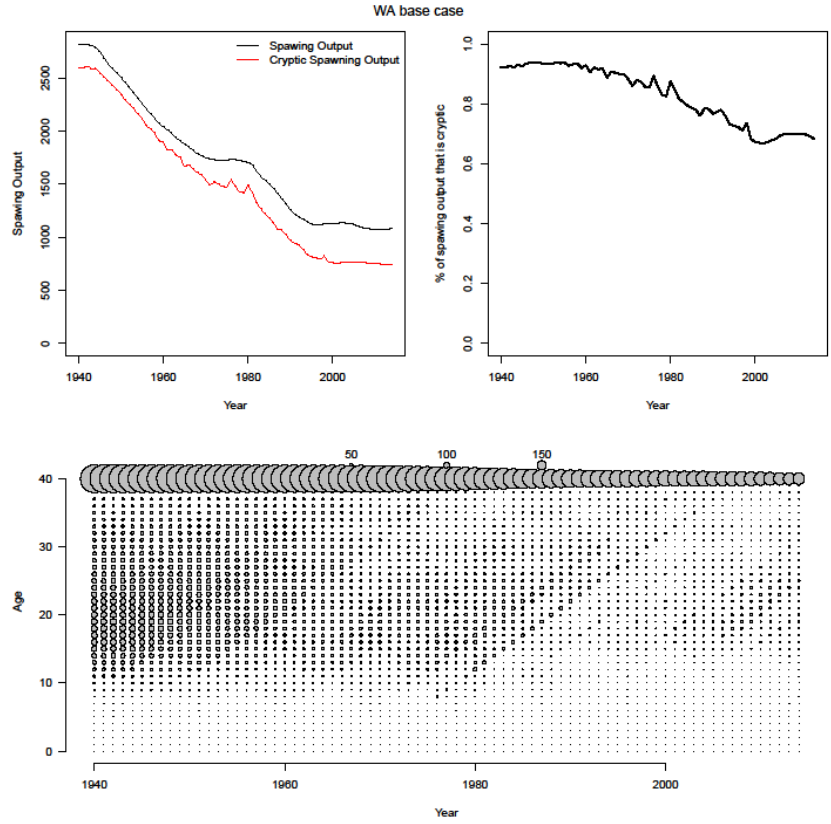
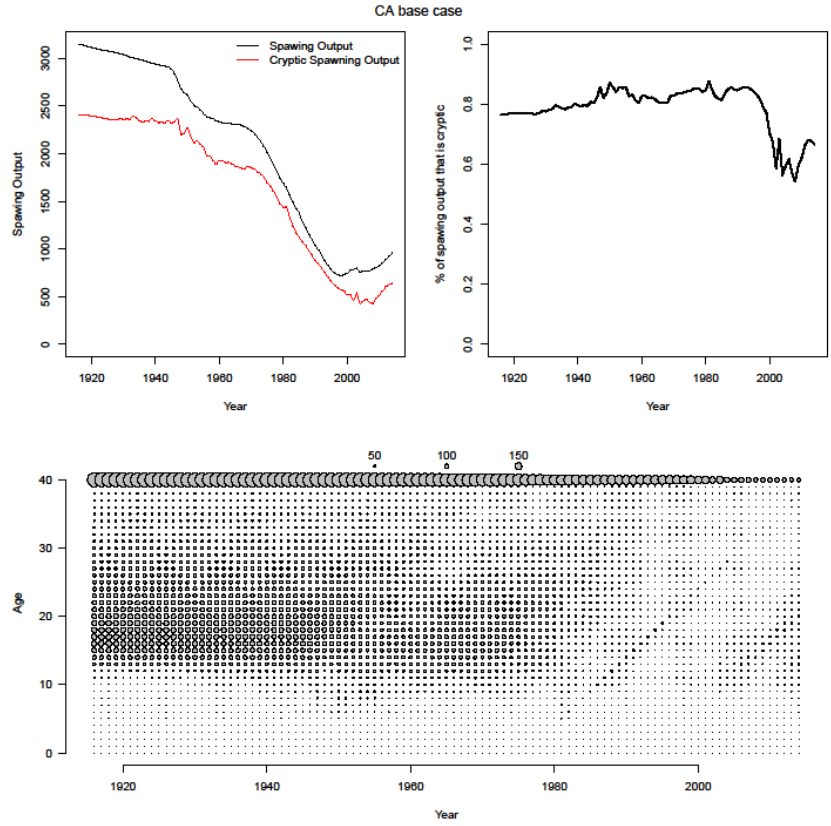


Figure 2. Unavailable spawning output for California.



2.2.4 Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.

Other than adjustments to the base model configuration noted below under 2.2.5, the Panel had no specific suggestions for further changes, so the modified base cases for Washington and California were the best currently available for the provision of management advice.

Standardized procedures for relative weighting within and across different data sources (particularly length and age composition, age at length composition and abundance indices) are currently an area of active research. The STAT has used the currently recommended procedure of estimating additional sds for abundance indices, Francis weighting for length and marginal age composition data and further work was done during the workshop to establish an appropriate method for weighting age-at-length data. There is currently a lack of consensus on an agreed approach for weighting conditional age-at-length data. A workshop is planned for later this year that might provide guidance. For this assessment, the Panel chose to use unweighted otolith counts as any weighting that downweights CAAL data leads to many values less than 1 that are then upscaled to 1 by SS, potentially producing a bias. A work-around of using lambda values to avoid this bias was applied during the subsequent STAR Panel 4, but had not been discovered for this meeting.

2.2.5 Determine whether the science reviewed is considered to be the best scientific information available.

Responses to earlier review recommendations.

A required section of the draft stock assessment document is responses to STAR panel recommendations from the most recent previous assessment. The STAT adequately responded to most of those recommendations. Those that remain to be further addressed were:

South of Cape Falcon:

Explore alternative stock hypotheses, continue exploration of using multiple areas.

North of Cape Falcon:

Tagging is not dealt with in the model as a tagging experiment (a limitation of SS), full uncertainty in the catch history has not been explored.

Requests and responses during the meeting

Additional explorations and requests led to five changes to the draft Washington and California assessments that were agreed by the STAT to be included in the accepted base cases: (1) use of an improved functional maturity relationship explored during the meeting, (2) exclusion of dome-shaped selection except for the live-fish fishery, (3) estimation of sex-

specific M within the model, (4) only estimating recruitment deviations that were informed by data as indicated by the recruitment deviation variance, and (5) using a fixed value of sigma r of 0.5 with no re-tuning.

During this STAR Panel there was a considerable amount of time spent on examination of delta GLM area:year effects, lack of change in AIC values for some effects for gamma and binomial error distributions and whether step-wise model selection was appropriate. Also, there was an examination of the filtering used for the nearshore commercial logbook index. Much of this work during a STAR Panel would be avoided if a pre-assessment data meeting had carried it out, and the documentation/diagnostics provided as background for the abundance indices to the STAR Panel was improved.

2.2.6 When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.

I agree with the research recommendations in the STAR Panel report made specifically for Black rockfish and will not repeat those here. As I have attended all of the STAR Panel meetings this year, I have been accumulating general recommendations that apply to all rockfish species, some of which appear in the STAR Panel report in reduced form, so I will include those here.

Research recommendations carried over from previous reviews (short-medium term)

South of Cape Falcon: Explore alternative stock hypotheses, continue exploration of using multiple areas.

North of Cape Falcon: Tagging information has been analysed externally to the assessment model to provide indices of abundance as assessment input. Some assessment models allow tag and recapture data as input data, allowing the assessment to make population estimates that include uncertainties related to the tagging study. Implementation of the use of raw tagging study data as input may be a current limitation of SS but could be further investigated. Full uncertainty in the catch history has not been explored.

Data preparation (medium-term)

- There is a need for more detailed examination of input data prior to stock assessment particularly in relation to sample size and representativeness. An examination of data sources by year, and sub-area in particular, may suggest appropriate methods for post-stratification of composition data (also potentially season, depth, boat type, etc., depending on source).

- Continue work to automate data preparation as much as possible, incorporating recommended procedures for data filtration and post-stratification of composition data.

- Additional work is required in each state to better justify most likely catch histories and also to define alternatives that encapsulate major uncertainties for model sensitivity

testing. This will greatly assist assessment teams to more fully explore the effect of catch uncertainty on model results.

- Formal rockfish catch reconstructions have been completed for California and Oregon but not for Washington.

Independent measures of stock biomass (medium-term)

Continued work on definition and measurement of suitable habitat for black rockfish especially combined with density estimates would assist many aspects of the assessment, particularly as an independent indicator of plausible relative scale of modeled virgin biomass by area/region/state.

Stock boundaries (medium-term)

Additional work to further develop an objective procedure for evaluating the chosen stock boundaries across all rockfish (and potentially all other) assessments may be beneficial, and also more directly point to required directions for future research or assessment collaboration across national/international political boundaries.

Pre-assessment data workshop (short-term)

A specific data meeting perhaps for all rockfish could examine information across a broad range of species due for assessment, and would also assist with the development of more specific documentation of protocols used to compile best available data sets for stock assessment, continue acceptance of agreed procedures for standardization of abundance indices, and also begin work on procedures for the development of alternative data series that capture uncertainty – particularly for historical catch and discards. This would assist in the prevention of data issues becoming apparent later in the process – as has occurred this year for other rockfish species. A nearshore stock assessment workshop was carried out with some of these objectives in 2015 for Black rockfish, China rockfish and Kelp greenling, so input data for Black rockfish was subjected to earlier examination this year.

Abundance indices (short-medium term)

- Consider the development of a fishery-independent survey for nearshore stocks. As the current base model structure has no direct fishery-independent measure of recent rebuilding of the adult portion of the stock, any work to commence collection of such a measure for nearshore rockfish, or use of existing data to derive such an index would greatly assist with this assessment.

- An objective procedure for selection of sub-model error structure (usually gamma or lognormal here) is required for delta-GLM procedures. Consistency is required for the model selection process – preferably using *a priori* candidate models rather than step-wise selection. The standard delta-GLM procedure should allow for different factors to

be considered in the binomial and sub-models. A standard set of diagnostics should be provided to review panels for each abundance index.

- A multi-species simulation study to test whether the Stephens-MacCall filtering may lead to a bias in abundance estimates given differences in abundance trends among species should be considered. Some of this work has been done (Andi Stephens, PhD thesis) and should be published.

Data weighting

Standardized procedures for relative weighting within and across different data sources (particularly length and age composition, age at length composition and abundance indices) are currently an area of active research. Currently recommended procedures are to estimate an additional sd for abundance indices, and to use Francis weighting for length and marginal age compositions. There is currently a lack of consensus on an agreed approach for weighting conditional age-at-length data. A workshop is planned for later this year, which may provide guidance if new research that resolves current questions is presented at that meeting.

R4SS/SS3 standard procedures (short-medium term)

- Examination of comparable abundance indices plotted together is a useful consistency check that should be included as part of all assessments with a large number of indices. R code was used by the China rockfish STAT that plotted all indices on the same graph as well as the available biomass for each index from the base model that should be considered as an addition to R4SS.

- The R code developed at the Black rockfish STAR Panel to examine unexploitable spawning output should be a standard model diagnostic included in R4SS.

- A procedure for examination of sources of information on annual recruitment events is required particularly for models where recent recruitment levels are uncertain and have a great impact on projections: profile over recruitment events? Or partition likelihood components?

- A standard procedure for appropriate choice of bounds for jittering is required.

- A method to examine observed and expected sex ratio by age and through time would resolve questions about the appropriateness of sex ratios being produced for the modeled population.

- Weighted residual plots combined across data sources for length and marginal age compositions would allow overview judgment of the model fit to composition data (perhaps catch weighted for fleets with associated catch only?).

- Removal of the re-scaling to 1 problem in SS after weighting is applied to composition data

- Development of standard procedures for the selection of the most appropriate weighting system that should be applied to input data (additional sd for indices, harmonic mean/Francis/other for length and marginal age comps, Harmonic mean/Francis A/other for conditional age-at-length data.

- Where current models appear to provide implausible recruitment deviations particularly early in the series, further work to use available options in SS to force improved model behavior in that period may provide an acceptable resolution. In addition, this work may provide guidance for additional flexibility that might be added to SS to better handle the problems of recruitment estimation.

- The SS input interface is not user-friendly and requires considerable knowledge of formatting requirements and the meaning of some settings in relation to how the model is configured or parameterized. The development of software that includes expert knowledge of common configuration errors and solutions that can be run on model input settings would quickly resolve many common problems.

- Consider the use of "breakout rules" to more objectively determine when the most recent stock assessment has become inconsistent with recent data. An example of such a rule used in Australia examines predicted CPUE trends from the stock assessment model (updated with recent catches) against recent observed CPUE trends (see Appendix 2).

Further investigation of appropriate values for natural mortality and steepness (short/medium term)

- Basic life history research may help to resolve assessment uncertainties regarding appropriate values for natural mortality and steepness.

- Additional work to determine the most appropriate prior to use for each species is required (especially on whether the current species should be included in the meta-analysis that determined the prior).

Assessment documentation (short-term)

The outline for stock assessments (Appendix B in the 2014 Terms of Reference) includes a section for addressing previous STAR Panel recommendations. If a data workshop precedes the stock assessment, as here for Black rockfish, the outline should also include a section on how the recommendations from the data workshop were addressed. Previous CIE reports should also be available as background information for STAR Panels.

It would assist in the review process if reviewers were routinely given access to model input files so that they can run the draft base case prior to the review for themselves, if they wish –

particularly for SS assessments. It has been good practice to include the starter, data and control files in the draft assessment documentation so that settings can be examined directly in the document. However, there is advantage for reviewers to run the model and examine R4SS output – particularly as it may include diagnostics and plots that are not included in the draft assessment document. As SS is constantly under development, it may also be the case (as here) that the SS version used is more recent than that available publicly from the NOAA toolbox. A simple solution would be to provide the draft base model input files and also the SS executable version used on the FTP site used for the review, at the same time as documents are made available prior to the meeting.

The Terms of Reference for the Groundfish and Coastal Pelagic Species Stock Assessment Review by the Pacific Fishery Management Council (September 2014) provides a good outline for stock assessment documents (Appendix B) that ensures consistency for draft assessments. While I hesitate to add to the standard requirements, and therefore the work required of the STAT prior to review, there are four items that could be considered, regarding additional new standard R4SS output, a summary table of abundance indices, bridging analysis and tables for comparison of sensitivity analyses.

Several recommendations for new procedures to incorporate as standard output in R4SS have been made above that may be considered for standard inclusion in the standard assessment outline.

A summary of abundance indices used (as in Tables 1 and 2 here) should be considered for standard inclusion in assessment documentation The STATs should also provide an indication of the ranking of abundance indices in those tables. Ideally, those rankings would be provided from an earlier data workshop that precedes stock assessment, and they should indicate how much additional freedom a model should be given to add process error to an index – i.e. rankings indicate how relatively well indices reflect abundance and are unlikely to be biased (they should not be based on information already available such as the length of a series, or the magnitude of the measurement error).

Where assessments are regularly made for the same species using the same modeling framework, an opportunity arises to comprehensively and transparently provide an audit trail on model changes since the last assessment – commonly called a bridging analysis. Such a bridging analysis involves examination of absolute spawning biomass and recruitment trends over time after the application of sequential changes to model source code version revision, structural assumptions, changes to fixed parameter values or priors, and the inclusion of recent data (source by source where possible – catch, index, age and length composition by fleet). This provides a continuum from the previous assessment to the current base case. Such a process (or an improvement on it) could be considered in the future for any regular SS assessments in the US. It is understood that a detailed bridging analysis may not be required if the absolute biomass and recruitment series have changed little from one assessment to the next, but experience says that this is rarely the case.

For comparison and evaluation of sensitivity analyses it has become standard practice elsewhere to construct tables as detailed for the Canary rockfish assessment in my report for STAR Panel 1 that I think should be considered as standard procedure. The Black rockfish

assessment did provide this information for CA and WA (but not OR) as a supplementary table prior to the review.

Standard diagnostics for spatial models (medium-term)

A recent paper by Punt et al. (2015) highlights that adding spatial model structural components (allowing separate stock dynamics by area, including distdevs, area-specific selectivity, allowing mixing) have the potential for the introduction of bias. How far this process should be taken depends on available data. There is a question of what standard diagnostics might assist with making the decision on how far to go with a spatial analysis, and what structural aspects are supported by available data. Punt et al. (2015) say "we propose conducting sensitivity analyses based on several model configurations to select the appropriate structure for an assessment" and "the capacity to examine model residuals spatially remains valuable for inferring problems with model specification". What additional standard diagnostics (specifically that could be added to R4SS) might assist with this is an open question. New spatial models are likely to become more commonly proposed as the best currently available, and standard objective procedures for evaluation of spatial models are a work in progress.

2.2.7 Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Terms of Reference and assignment of reporting duties.

The agenda had assignment of reporting duties for the first day. As the proceedings tend to concentrate on STAR Panel requests and responses for the first four days, with drafting of the report on the last day, the assignment of duties concentrated more specifically on the recording of the Panel requests and responses. As there were three reviewers and the Chair was to compile the final report, each reviewer was assigned to concentrate on responses and report comments on data (Neil Klaer), model (Patrick Cordue), and uncertainties (Paul Spencer) respectively. Satisfactory progress was made, allowing initial wording for the meeting report to be provided as a basis for drafting on the last day.

Agreement on the STAR Panel Meeting Report

All three Panel reviewers and the Chair agreed on the language that appears in the STAR Panel Meeting Report.

References

Francis, R. I. C. C. 2011. Data weighting in statistical fisheries stock assessment models. Canadian Journal of Fisheries and Aquatic Sciences 68:1124–1138. Francis 2011

Punt, A.E., Haddon, M., Tuck, G.N. 2015. Which assessment configurations perform best in the face of spatial heterogeneity in fishing mortality, growth and recruitment? A casestudy based on pink ling in Australia. Fisheries Research 168:85–99

Sampson, D.B. 2007. The Status of Black Rockfish off Oregon and California in 2007. Pacific Fishery Management Council, Portland, OR.

Wallace, F.R., Y.W. Cheng, and T.S. Tsou, 2008. Status of the Black Rockfish Resource north of Cape Falcon, Oregon to the U.S.-Canadian border in 2006. In Pacific Fishery Management Council. 2009. Appendix: Status of the Pacific Coast Groundfish Fishery Through 2007 and Recommended Biological Catches for 2009: Stock Assessment and Fishery Evaluation. Pacific Fishery Management Council, Portland, Oregon.Wallace 2008

Appendix 1. CIE Statement of Work

External Independent Peer Review by the Center for Independent Experts

Stock Assessment Review (STAR) Panel 3

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from *www.ciereviews.org*.

Project Description:

The National Marine Fisheries Service and the Pacific Fishery Management Council will hold four stock assessment review (STAR) panels and potentially one mop-up panel if needed, to evaluate and review benchmark assessments of Pacific coast groundfish stocks. The goals and objectives of the groundfish STAR process are to:

1) ensure that stock assessments represent the best available scientific information and facilitate the use of this information by the Council to adopt OFLs, ABCs, ACLs, (HGs), and ACTs;
2) meet the mandates of the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) and other legal requirements;
3) follow a detailed calendar and fulfill explicit responsibilities for all participants to produce required reports and outcomes;
4) provide an independent external review of stock assessments;
5) increase understanding and acceptance of stock assessments and peer reviews by all members of the Council family;
6) identify research needed to improve assessments, reviews, and fishery management in the future; and
7) use assessment and review resources effectively and efficiently.

Black rockfish is an extremely important species to both the commercial and recreational fisheries and has not been assessed since 2007. A benchmark stock assessment will be conducted and reviewed for black rockfish that will encompass its coast-wide range. In 2007,

independent assessment models were developed for northern and southern portions of the coast. The 2015 assessment will reconsider how best to model this stock, in light of any regional differences biology, exploitation, and data availability, maintaining consistent modeling approaches, where possible. Because of the expected number of regional models, as well as the availability of new data series and approaches to modeling available tagging data, the SSC has recommended that this assessment be afforded a full STAR panel for its review.

This assessment will provide the basis for the management of the black rockfish stock off the West Coast of the U.S., including providing the scientific basis for setting OFLs and ABCs as mandated by the Magnuson-Stevens Act. The technical review will take place during a formal, public, multiple-day meeting of fishery stock assessment experts. Participation of external, independent reviewer is an essential part of the review process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Two CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. One of the CIE reviewers will participate in all STAR panels held in 2015 to provide a level of consistency between the STAR panels. The CIE reviewers shall be active and engaged participants throughout panel discussions and able to voice concerns, suggestions, and improvements while respectfully interacting with other review panel members, advisors, and stock assessment technical teams. The CIE reviewers shall have excellent communication skills in addition to working knowledge and recent experience in fish population dynamics, with experience in the integrated analysis modeling approach, using age-and size-structured models, use of MCMC to develop confidence intervals, and use of Generalized Linear Models in stock assessment models. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: For the **STAR panel 3** review, each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Newport, Oregon during the dates of July 20-24, 2015.

Statement of Tasks: Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later than the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html.

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review. Documents to be provided to the CIE reviewers prior to the STAR Panel meeting include:

- The current draft stock assessment reports;
- The Pacific Fishery Management Council's Scientific and Statistical Committee's Terms of Reference for Stock Assessments and STAR Panel Reviews;
- Stock Synthesis (SS) Documentation
- Additional supporting documents as available.
- An electronic copy of the data, the parameters, and the model used for the assessments (if requested by reviewer).

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the STAR Panel 1 review meeting **scheduled in Newport, Oregon during the dates of July 20-24, 2015** as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
3) No later than, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to *shivlanim@bellsouth.net*, and to Dr. David Die, CIE Regional Coordinator, via email to *ddie@rsmas.miami.edu*. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Tentative Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

June 1, 2015	CIE sends reviewer contact information to the COR, who then sends this to the NMFS Project Contact
June 22, 2015	NMFS Project Contact sends the CIE Reviewers the pre-review documents
July 20-24, 2015	Each reviewer participates and conducts an independent peer review during the panel review meeting
August 7, 2015	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
August 21, 2015	CIE submits CIE independent peer review reports to the COR
August 28, 2015	The COR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) each CIE report shall address each ToR as specified in **Annex 2**,
(3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, COTR
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Key Personnel:
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Jim.Hastie@noaa.gov Phone: 206-860-3412

Stacey Miller, NMFS Project Contact
National Marine Fisheries Service,
55 Great Republic Drive,
Gloucester, MA 01930
Phone: 978-281-9203

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

Stock Assessment Review (STAR) Panel 3

1. Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.
2. Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.
3. Evaluate model assumptions, estimates, and major sources of uncertainty.
4. Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.
5. Determine whether the science reviewed is considered to be the best scientific information available.
6. When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.
7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Annex 3: Tentative Agenda

Final Agenda to be provided two weeks prior to the meeting with draft assessments and background materials.

Stock Assessment Review (STAR) Panel 3
NMFS Northwest Fisheries Science Center
Newport Research Station, Bld. 955
2032 SE OSU Drive,
Newport, Oregon 97365
Phone: 541-867-0500

July 20-24, 2014

Monday, July 20

8:30 a.m.	Welcome and Introductions
9:15 a.m.	Review the Draft Agenda and Discuss Meeting Format (Chair) - Review Terms of Reference (TOR) for assessments and STAR panel - Assign reporting duties - Discuss and agree to format for the final assessment document - Agree on time and method for accepting public comments
9:30 a.m.	Presentation of Assessment 1 - Overview of data and modeling
12:30 p.m.	Lunch (On Your Own)
1:30 p.m.	Q&A session with STAT_1 STAR Panel discussion - Panel develops written request for additional model runs / analyses
3:30 p.m.	Presentation of Assessment_2 (if time allows) - Overview of data and modeling
5:30 p.m.	Adjourn for Day.

Tuesday, July 21

8:30 a.m.	Continue Presentation of Assessment_2 - Overview of data and modeling
12:00 p.m.	Lunch (On Your Own)
1:30 p.m.	Q&A Session with STAT_ 2 Panel Discussion - Panel develops written request for additional model runs / analyses
4:30 p.m.	Check in with –STAT_1
5:30 p.m.	Adjourn for Day.

Stock Assessment Review (STAR) Panel 3

Wednesday, July 22

8:30 a.m. Presentation of First Set of Model Runs
- Q&A session with STAT_1 & Panel discussion
- Panel develops request for second round of model runs / analyses –STAT_1

12:00 p.m. Lunch

1:30 p.m. Presentation of First Set of Model Runs
- Q&A session –STAT_2 & panel discussion
- Panel develops request for second round of model runs / analyses –STAT_2.

5:30 p.m. Adjourn for day.

Thursday, July 23

8:30 a.m. Presentation of Second Set of Model Runs
- Q&A session –STAT_1 & panel discussion
- Agreement of preferred model and model runs for decision table
- Panel continues drafting STAR report.

12:00 p.m. Lunch (On Your Own)

1:00 p.m. Presentation of Second Set of Model Runs
- Q&A session –STAT_2 & panel discussion
- Agreement of preferred model and model runs for decision table
- Panel continues drafting STAR report.

4:00 p.m. Continue Panel Discussion or Drafting STAR Panel Report

5:30 p.m. Adjourn for day.

Friday, July 24

8:30 a.m. Consideration of Remaining Issues
- Review decision tables for assessments

10:00 a.m. Panel Report Drafting Session

12:00 p.m. Lunch (on your own)

2:00 p.m. Review First Draft of STAR Panel Report

4:00 p.m. Panel Agrees to Process for Completing Final STAR Report by Council's June Meeting Briefing Book Deadline

5:30 p.m. Review Panel Adjourn.

Appendix 2: Bibliography of materials provided for review

Draft Stock Assessment Document:
Draft 2015 California, Oregon and Washington Black rockfish assessment

Background Materials
2003 Black rockfish assessment
2007 Black rockfish north of Cape Falcon assessment
2007 Black rockfish off Oregon and California assessment
2003 Black rockfish STAR Panel report
2007 Black rockfish north STAR Panel report
2007 Black rockfish south STAR Panel report

NWFSC. 2014. Terms of Reference for the Groundfish and Coastal Pelagic Species Stock Assessment Review Process for 2015-2016. NOAA Pacific Fishery Management Council Report.

PFMC. 2014. Status of the Pacific Coast Groundfish Fishery: Stock Assessment and Fishery Evaluation. PFMC Report.

PFMC. 2015. Report on the Nearshore Stock Assessments Workshop.

Scientific and Statistical Committee's Groundfish Subcommittee, 2013. Report on the March meeting to review proposed methods for constructing and analyzing abundance indices that could potentially be used in data-moderate stock assessments.

Thorston, J. 2015. Estimating a Bayesian prior for steepness in Pacific rockfishes (Sebastes spp.) off the U.S. West Coast for the 2015 assessment cycle.

Stock Synthesis Model-Related Documents

Methot, R. D. 2012. User Manual for Stock Synthesis Model Version 3.24s. Updated February 11, 2015. NOAA Fisheries, Seattle, Washington.

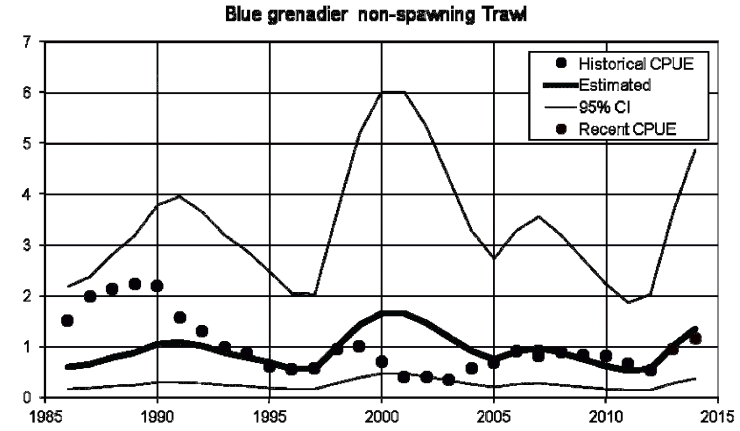
Methot, R.D. and Wetzel, C. 2013. Appendix A: Technical Description of the Stock Synthesis assessment program.

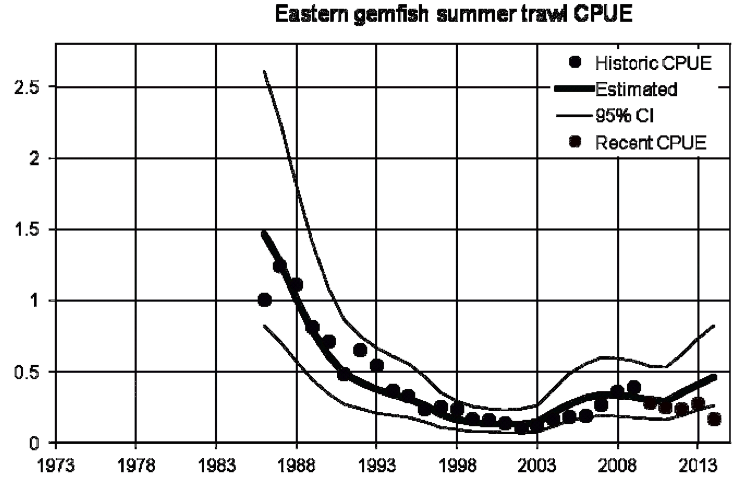
Appendix 3. Example "breakout rule" used in the Australian Southern and Eastern Scalefish and Shark Fishery

A number of Southern and Eastern Scalefish and Shark Fishery (SESSF) quota species on Tier 1 are managed on Multi-Year Total Allowable Catches (MYTACs) so that stock assessments are performed for those species at 3-5 year intervals. The most recently accepted base case stock assessment for each MYTAC stock is used to set future Recommended Biological Catches (RBCs) for the stock during the MYTAC period. Each year, to evaluate the continuing accuracy of the model predictions, actual catches are entered into the model and predicted catch rates are forecast. If observed catch rates fall outside of a 95% confidence interval around the forecast catch rates, then management attention is directed towards the stock.

The process of calculating review triggers involves the following steps:

1. Update the standardized CPUE for the stock of interest.
2. Obtain the recent catch history for the stock (i.e. the catches taken from the stock during the years since the stock assessment model was last updated).
3. Use the base case stock assessment model to project the stock to the current year, given the catches from step 2.
4. Adjust the CPUE series from step 1 to match the CPUE series used to tune the assessment model, calculate 95% confidence bounds (CI) around the forecast CPUE, and determine whether the most recent observed CPUE points fall within the CI.





Appendix 4: List of participants

STAR Panel Members

Dr. Andrew Cooper, Simon Fraser University, SSC (Chair)
Dr. Neil Klaer, Center for Independent Experts
Mr. Patrick Cordue, Center for Independent Experts
Dr. Paul Spencer, National Marine Fisheries Service Alaska Fisheries Science Center

Stock Assessment Team (STAT) Members:

Dr. Jason Cope, National Marine Fisheries Service Northwest Fisheries Science Center
Dr. Andi Stephens, National Marine Fisheries Service Northwest Fisheries Science Center, GMT
Dr. David Sampson, Oregon State University, SSC
Dr. Megan Stachura, National Marine Fisheries Service Northwest Fisheries Science Center
Dr. Theresa Tsou, Washington Department of Fish and Wildlife, SSC
Mr. Troy Buell, Oregon Department of Fish and Wildlife
Mr. Brett Rodomsky, Oregon Department of Fish and Wildlife
Mr. Patrick Mirick, Oregon Department of Fish and Wildlife
Mr. Phil Weyland, Washington Department of Fish and Wildlife
Ms. Kari Fenske, Washington Department of Fish and Wildlife

STAR Panel Advisors

Mr. John Holloway, GAP
Ms. Heather Reed, Washington Department of Fish and Wildlife, GMT
Mr. John DeVore, Pacific Fishery Management Council